FULL LENGTH	Iranian Biomedical Journal 22 (1): 15-21 January 2018

Low Level of Autophagy-Related Gene 10 (*ATG10*) Expression in the 6-Hydroxydopamine Rat Model of Parkinson's Disease

Marzieh Shams Nooraei[1], Ali Noori-Zadeh[2], Shahram Darabi[*1], Farzad Rajaei[1], Zohreh Golmohammadi[1] and Hojjat Allah Abbaszadeh[3]

[1]Cellular and Molecular Research Center, Qazvin University of Medical Sciences, Qazvin, Iran; [2] Department of Clinical Biochemistry, Faculty of Medicine, Ilam University of Medical Sciences, Ilam,Iran; [3]Hearing Disorder Research center, Shahid Beheshti University of Medical Science,Tehran, Iran

Receivd 10 December 2016; revised 6 May 2017; accepted 8 May 2017

ABSTRACT

Background: Autophagy is a mechanism disassembling the damaged organelles from the cell. This study attempted to examine the expression of several autophagy-related genes in Parkinson's disease (PD) rat model. **Methods:** The male Wistar rats were divided into three groups as control, sham, and lesion. In the latter group, the PD rat model was induced by the injection of 6-hydroxydopamine in the striatum. The behavioral test was conducted one (baseline) and four weeks after the surgery through apomorphine hydrochloride. Then the RT-PCR technique was employed to evaluate the expressions of *p62/SQSTM*, autophagy-related genes *(ATG)5*, *ATG12*, *ATG16L1*, *ATG10*, as well as *GAPDH* and *LC3*. **Results:** By injecting apomorphine, the striatal lesion group showed a significant contralateral rotation at fourth week as compared to the baseline. The examination of *p62*, *ATG5*, *ATG12*, *ATG16L1*, and *LC3* expressions using RT-PCR revealed that *p62*, *ATG5*, *ATG12*, *LC3*, and *ATG16L1* were expressed in the substantia nigra of PD rat model, while *ATG10* was not expressed. **Conclusion:** ATG10 expression is necessary for the initiation of autophagy. Thus, these results show that autophagy deregulation occurs in the initiation stages of the process in the rat model of PD. ***DOI: 10.22034/ibj.22.1.15***

Keywords: Parkinson's disease, Autophagy, 6-hydroxydopamine (6-OHDA), ATG16L, ATG10

Corresponding Author: Shahram Darabi
Cellular and Molecular Research Center, Qazvin University of Medical Science, Qazvin, Iran; Tel.: (+98-28) 33336001;
E-mail: shahram2005d@yahoo.com or shdarabi@qums.ac.ir

INTRODUCTION

Parkinson's disease (PD) affects the central nervous system in adults at later ages[1]. The loss of dopaminergic neurons in the substantia nigra is responsible for PD motor symptoms[2]. PD is characterized based on the aggregation of alpha-synuclein protein, as a constituent compound of Lewy bodies, at the cellular and molecular levels[3,4]. The genetic causes of PD have been identified for about 10% of the cases[5]. Evidence suggests that mitochondrial dysfunction contributes to protein aggregation and autophagic stress in the pathogenesis of neurodegenerative diseases[6].

Autophagy is a physiological process playing an important role in cell homeostasis through the digestion of damaged proteins and organelles[7]. Numerous studies suggest that impaired autophagy leads to aging and neurodegenerative diseases such as PD[8-14], Alzheimer's[15], and Huntington's disease[16].

In this regard, the executers of autophagy, including *p62/SQSTM*,*LC3* and autophagy-related genes (*ATG*) such as *ATG5*, *ATG12*, *ATG16L1*, and *ATG10* are associated with PD development[17-21]. ATG10 contributes to autophagosome formation by interacting with ATG7 to receive ATG1, which is an ubiquitin-like molecule. Moreover, it contributes to the formation of autophagosome in the reaction of ATG5-ATG12 conjugation[22]. More details about ATG10 roles in autophagy can be found in recent studies[23,24].